

## REMARKS

Applicant wishes to thank Examiner Bonzo for having indicated that claim 84 is "objected to while containing allowable subject matter." The Examiner does not indicate, however, what action the Applicant should take to obtain allowance.

The Applicant speculates that the claim might be allowed if rewritten in independent form, including all the limitations of the sole parent claim. This has been done, and allowance of claim 84 as amended is therefore respectfully requested.

Applicant also thanks the Examiner for having conceded that the previous rejections were inapposite to Applicant's claims as amended, and for having withdrawn the previous rejections based on Rasmussen.

### Concordance of references to claims

In view of the nonlinear or nonsequential presentation of claims — in the claim sequence itself and the Official Action, and therefore in this document — it may be helpful to have the following listing that shows very roughly the pages where reasoning can be found as to each of the claims in this case. Because

all the claims are included in the summary at page 2 of the Official Action, the page 2 summary is omitted from this listing:

<u>claim</u>	<u>Official Action</u>	<u>this response</u>
1	5	31, 34, 38, 56, 57
2	3, 14	28, 44-50, 52-57
3	3, 14, 16	28, 44-50, 54-57
4	4, 5	30, 33-36, 54
5	5, 6	34, 54
6	5, 6	34, 36, 45, 54
7	3, 5, 6	28, 34, 43, 54
8	5, 6	34, 54
9	5, 7	34, 38, 54
10	14, 17	44-50, 54, 57, 58
11	5, 7	34, 54
12	3, 14, 18	28, 44-50, 54, 55
13	5, 7	34, 41-43
14	5, 8	34, 41-43
15	5, 8	34, 41, 42
16	4, 5, 8	30, 33-36, 42
17	5, 9	34, 42
18	14, 21	42, 44-50, 54, 55
19	3, 5, 9	28, 34, 41-43
20	5, 9	34, 41, 42
21	5, 9	34, 40-42
22	14, 22	42, 44-50, 56-58
23	14, 23	42, 44-50, 57
24	3, 14, 25	28, 42, 44-50, 54, 55
25-32	3	canceled; 28
33	14, 26	43-49, 54, 55
34	14, 28	42, 44-49, 54, 55
35	14, 28	44-49, 54, 56, 57
36	4, 14, 29	30, 33, 36, 44-49, 54, 55
37	14, 29	40, 44-49, 54, 55
38	14, 30	38, 44-49, 54, 55
39, 40	~	canceled
41	3, 14, 30	28, 44-50, 54, 55
42	5, 10	34-36, 42-49
43	5, 11	34, 40, 42-49
44	5, 11	34, 42-49
45	5	34, 38, 42, 44-49

<u>claim</u>	<u>Official Action</u>	<u>this response</u>
46	14, 31	42-50, 57
47	4, 5, 11	30, 33, 34, 36, 42-44
48	5, 11	34, 38, 42-44
49	14, 32	42-50, 56
50	14, 36	44-55
51	14, 37	44-55
52	14, 33	44-50, 56, 58
53	5, 12	34
54	3, 5, 34	28, 34, 54, 55
55	14, 39	44-49, 56-57
56	14, 41	44-55, 57
57	14, 41	38, 44-55, 57
58	14, 41	42, 44-55, 57
59	4, 14, 42	30, 33, 36, 44-55, 57
60	14	canceled; 55
61	3, 14, 42	28, 44-55, 57
62	12	27, 42
63	4, 5, 13	30, 33, 34, 36, 42
64	3, 14, 42	28, 42, 44-50, 55
65	3, 14, 45	28, 42-49, 55
66	3, 4, 14, 47	28, 30, 33, 36, 43, 44-49, 54, 55
67	3, 14, 47	28, 38, 44-49, 54, 55
68	3, 14, 47	28, 42, 44-49, 54, 55
69	3, 14, 47	28, 44-49, 54-57
70	5, 10	canceled; 34, 38, 50, 55
71	14, 38	38, 44-55
72	14, 38	42, 44-55
73	14, 38, 44	44-56
74	14, 38	44-55, 57
75	14, 41	44-55, 57
76	5, 13	34, 38, 42
77	5, 13	34, 42
78	14	44-50, 57
79	2, 5, 7	27, 34, 40
80	14, 20	44-50, 54, 55
81	14, 48	38, 43-49, 56, 57
82	4, 14, 49	30, 33, 36, 38, 44-49, 56, 57
83	14, 50	38, 44-49, 56, 57
84	50	24

### Status of claim 62

It is suggested in the Official Action that claim 62 is no longer pending in this application (see the Office Action Summary, at "Disposition of Claims" — block 4). In the July 2005 Action, however, claim 62 was acknowledged as pending — and in the present Action argument is presented for its rejection (see bridging pages 12 and 13).

Applicant did not cancel or amend claim 62 in either of the intervening two October 2005 responses. It appears amended on page 20 of the October 12 response — and still standing on page 17 of the October 26 supplemental response.

The Applicant therefore believes that claim 62 continues in force. It is again amended in the present paper. Reasons for allowance are taken up below in due course, as particularly in the listing at pages 41 and 42.

### Rejections based upon Section 112

§ 112 FIRST PARAGRAPH — In the Official Action it is indicated that claim 79 contains subject matter not found in the original specification as filed. The Action asserts (emphasis added):

"At [no] point in the specification is it ever discussed whether the claimed invention is a circuit breaker. This claim is believed to be a result of a conversation with Applicant, and as such was not held by Applicant at the time of the filing . . . ."

The Applicant respectfully traverses. The Applicant agrees that the limitation was introduced by the Examiner in a telephone

interview — which in turn was placed on record by the memorialization of that interview that appears in the October 12, 2005 Amendment (bottom of page 27 in that paper).

Thus the subject limitation ("the apparatus is not a circuit breaker") has the same status as any other item of prior art cited by the Examiner. From the entire specification as originally deposited it is inherent, and very plain, that the Applicant's invention is not a circuit breaker.

Since the invention is inherently and plainly not a circuit breaker, and the Applicant obviously did know that at the outset, the Applicant is entitled to direct claims to this feature of the invention. Withdrawal of this rejection is therefore requested.

§ 112 SECOND PARAGRAPH — In the Official Action it is further said that sixteen claims are indefinite because (emphasis added):

"the Examiner is unable to determine the bounds of 'substantially exclusively made up of substantially commercial, off-the-shelf components.' . . . Applicant responses to this rejection previously reaffirm the Examiner's inability to precisely define metes and bounds . . . ."

For the following three reasons, the Applicant respectfully traverses. The claims are 2, 3, 7, 12, 19, 24, 41, 54, 61, and 64 through 69.

QUESTIONED WORD NOT PRESENT — First, the statement in the Official Action is factually in error. The underscored word "substantially" (which is the second occurrence of that word in the quotation above) does not appear in any of the subject claims.

At least one of the cited claims (namely claim 3) appears never to have recited even one occurrence of "substantially"; and one of these claims (claim 27) actually has been canceled (please

see pages 2 and 9 of the October 12 Amendment, and page 8 of the October 27 Amendment.

OTHER OCCURRENCE NOT A CONCERN — Second, in the telephone interviews the Examiner specifically indicated that he was not particularly troubled by the first occurrence of that word. (That occurrence affects only the quantitative measure of the basic and very straightforward limitation "exclusively made of [COTS] components".) Rather, he said, his concern was for the second occurrence, which operates in the realm of what the Examiner said he regarded as an inadequately-defined concept — "commercial, off-the-shelf".

Review of the correspondence will confirm the Examiner's concern for this second part of the overall limitation. He repeatedly expressed uncertainty how to deal with different kinds of modification, e. g. "overclocked" components.

While the Applicant expressly disagrees with this characterization by the Examiner (i. e., inadequately defined), the Applicant removed the term without prejudice — in the October 12 Amendment. Accordingly the Applicant has followed the Examiner's express suggestions for obtaining allowance of the fourteen revised claims (out of the sixteen cited ones).

The Applicant believes that these claims are in condition for allowance. Therefore the Applicant respectfully asks that the rejection of these claims be withdrawn.

APPLICANT HAS NOT "REAFFIRMED" — Third, the Applicant cannot understand the above-quoted statement in the Action: "Applicant responses . . . previously reaffirm the Examiner's inability to precisely define metes and bounds." For the record, Applicant of course understands that the Examiner takes that position; however, the Applicant has expressly and consistently presented

principled reasoning in support of both occurrences of the word "substantially". See, e. g., the October 12 Amendment in the passage bridging pages 24 and 25.

More extended analyses leading to the same conclusion can be seen in the Applicant's earlier responses. Hence it is believed that the Applicant has never expressly or implicitly "reaffirmed" — or affirmed even once — the Examiner's inability to precisely define metes and bounds of the claims.

§ 112 FOURTH PARAGRAPH — In the Official Action it is further said that eight claims "fail to further limit the scope of the claims." For the four reasons set forth below, the Applicant respectfully traverses. The claims are 4, 16, 36, 47, 59, 63, 66 and 82.

EXPRESS DEFINITION — First, in the Official Action it is asserted that (*italics in original, underscoring added*):

"The *such computer system* of these claims [in] each case has already been claimed verbatim in the parent claim. These claims recite a "such computer".

With respect, this assertion is factually in error.

As extensively explained in earlier papers, as well as in the telephone interviews, the Applicant's definition of the word "such" in the original specification expressly makes the computer system not an element of the claimed combination of the parent claims. (Please refer to the Specification at page 7, lines 8 through 16 — and also to the October 12 Amendment at page 26, line 6, through page 27 at midpage.)

This explicit hardware definition overrides and controls any interpretation based upon the relatively more-abstract concept of "failure". (See discussion below.)

The computer system thus is rather only a part of the environment, or operating context, of the claimed combination. The Applicant submits that this reason alone is sufficient to negate the current rejection.

SYSTEM "FAILURE" GOES ALONG WITH THE SYSTEM — Second, in this regard the Action now focuses upon the term "failure" in the phrase "failure of a computer system" — in the preambles of the parent claims. In the Official Action it is argued that existence of the concept of "failure" as a part of the hardware circuits (see, e. g., claim 1 at lines 7 and 8) forces the reader to recognize the computer system as a part of the combination claimed in the parent claim.

In previous Official Actions a corresponding rejection was lodged against the term "computer system". In response it was explained by Applicant that the use of Applicant's claim word "such" — defined explicitly in the specification, as noted above — expressly excluded the "system" from being a part of the parent-claim combination. It was further explained that the system becomes part of the combination only in the later dependent claims.

Now the Official Action shifts the focus to the "failure", saying (emphasis added):

"As the failure is recited in the body of the claim,  
. . . the Examiner is then required to find the com-  
puter system".

The Applicant respectfully protests that the "failure" is not a mechanical element but only a possibly occurring conceptual attribute of the system.

The whole purpose of the special usage of "such" is to define clearly in advance whether a competitor who makes, uses or



sells apparatus that includes no computing system is an infringer. This rationale is meaningless for a competitor who makes, uses or sells apparatus that includes no "failure". Yet the argument in the Official Action elevates this conceptual attribute to the status of a mechanical limitation.

The Applicant further submits that the "failure" simply goes along with the "computer system" — so that if that system is not an element of the claimed combination, in the parent claim, then neither is its possible "failure". It will now be seen that the argument set forth in the Official Action mires the discussion of this simple and straightforward matter in a semantic and existential bog.

That is, the claims state plainly that the computer system (along with, necessarily, its possible failure) is not an element of the parent-claim combination — but is an element of the dependent claim. This relationship is extremely straightforward.

The Applicant respectfully submits that the Official Action undertakes to complicate this simple relationship unreasonably. Worse, the Action does not suggest any acceptable alternative wording that would be acceptable to the Examiner, for eliminating this entirely semantic roadblock.

AMENDMENT — Third, yet once again in the interest of moving this case along toward issue, the Applicant has nevertheless amended the parent claims (and a number of other claims, for a reasonable degree of consistency and uniformity) to recite even more explicitly "such failure". With these revisions, the possible failure itself, as well as the system, is seen to be not an element of the claimed combination of the parent.

Rather, for the purposes of the parent claims (only), the possible failure expressly is merely a part of the recited context or environment of the invention; hence it is no longer true,

if it ever was, that "the Examiner is then required to find the computer system". Given these revisions, Applicant once again asks that these simple dependent claims, straightforwardly adding the computer system into the claimed combination, be allowed.

DRAMATIC CHANGE IN CLAIMED SCOPE — Fourth and finally, although it has been repeatedly said in the Official Actions that eight claims "fail to further limit" the parent claims, actually all but one of the eight (claims 16, 36, 47, 59, 63, 66 and 82) go well beyond "further limiting" — to almost reverse the parent-claim recitation. In this regard, all the parent claims of these enumerated seven dependent claims recite (emphasis added):

"the network is constructed to be initially and permanently distinct from such computing system".

While those seven parent claims expressly exclude the protected system from the network, the corresponding seven dependent claims expressly include the protected system in the apparatus. These recitations are entirely consistent, since the "network" is a subset of the claimed "apparatus".

Nevertheless, two distinctly different pictures of what is being claimed emerge from the parent claims and their dependent claims, respectively. Although the two pictures are not quite opposites, the "further limiting" of the parent claims is actually very dramatic. Please see, in this regard, the discussion of claim 4 below at pages 35 and 36.

Rejections based upon Section 102

In the Official Action it is further said that twenty-eight claims are anticipated by the patent to David W. Best et al. The claims are (including dependents) 1, 4 through 9, 11, 13 through 17, 19 through 21, 42 through 45, 47, 48, 53, 54, 63, 70, 76, 77 and 79. For the reasons detailed below, the Applicant respectfully traverses.

CLAIMS 1, 4 THROUGH 9, AND 79 — Claim 1, and hence all of its dependent claims including those listed here, recite (emphasis added):

"a hardware network of components, having substantially  
no software . . . ."

In the Official Action it is proposed that Best answers to this recitation, and particularly that he discloses (emphasis added):

"a hardware network of components, having substantially  
no software . . . (Figures 3, 4 and 5 [of Best] disclose a hardware network . . . )".

With respect, that statement is factually in error. Really Best discloses a software-driven system, as is clear from e. g. column 3, lines 61 through 63 (emphasis added):

"In the system of Fig. 1, the global buses are dynamically grouped under software control to form redundant communication channels."

He makes this same point crystal clear in at least these six other places:

column 3, lines 19 through 20,  
column 4, lines 55 through 66,

column 5, lines 18 through 25,  
and 54 through 59,  
column 6, lines 17 through 19,

and also on the patent coversheet — in his Abstract, at lines 10 through 17.

Therefore it is incorrect to call Best a "hardware network" as claimed, with "no software". Claim 1 cannot read on Best, and Applicant respectfully asks that this rejection be withdrawn.

CLAIM 4 — In addition to the no-software limitation discussed above, this claim also states that the apparatus comprises the protected computing system. Whereas it is asserted in the Official Action (page 5) that Best teaches an apparatus comprising the protected system, the Applicant for three reasons respectfully traverses:

BEST LACKS ENABLEMENT — First, that assertion in the Action is without meaningful basis in the Best disclosure. Best may possibly imply vaguely that computing capacities exist wherever Best's buses may lead — but he neither teaches nor presents any significant information about the associated computer or computers.

Therefore the Applicant respectfully submits that Best fails to provide enabling disclosure of a computing system that is part of a failure-detering apparatus — such as recited in e. g. claims 4 and 16. Enabling disclosure is a requirement for use of a reference to reject a claim.

OFFICE ACTION IS AMBIVALENT — Second, to the extent that Best provides any facts at all, it appears that such vaguely implied computing facilities are remote from, not any part of, Best's illustrated circuits. In fact, in the Official Action itself, at bottom of page 10, it is directly stated:

"the computer disclosed as running the applications [is] not part of the protection system but [is] at the other end of a bus".

Thus, with respect, the Official Action takes two diametrically inconsistent positions:

- at page 10, for purposes of rejecting claim 42 etc. under § 102, Best's protected computing system is called not part of the claimed apparatus; but
- at page 5 of the Action, for purposes of rejecting e. g., claim 4 under § 102, the protected computing system instead is part of that apparatus.

RESOLUTION OF INCONSISTENCY — Third, in the Official Action at page 10, the Commissioner has gone on record as taking the former position (the protected system is not part of the claimed apparatus). The Applicant submits that is this position which is the correct one, because of Best's above-mentioned failure to provide any enabling disclosure of a computing system.

This position is favorable to claim 4 under § 102. The Applicant therefore requests withdrawal of this rejection too.

The foregoing "comprises the protected computing system" analysis applies not only to claim 4 but also to claims 16, 36, 47, 59, 63, 66 and 82. Therefore the Applicant also respectfully asks that all these claims be allowed.

CLAIM 6 — In addition to the no-software limitation discussed above, this claim recites (emphasis added):

"the circuits are not capable of running any application program."

In the Official Action it is said Best answers to this recitation. Specifically, the Action argues, Best's (emphasis added):

"circuits are not operable [sic, capable] of running an application program (column 6 lines 28-45: no application programs are disclosed and the logic elements are simple comparators and voters which [sic, "without"?] the ability to carry out application execution)."

With greatest respect, these statements too are factually in error. The argument in the Official Action fails to take into account the whole system described by Best. Best does not have only hardware — his dead hardware alone could do nothing at all.

He points out over and over that his hardware relies upon controlling software to work, and his drawings refer to a "host processor" that of course runs applications programs. This conclusion is irrefutable, as Best repeats those key facts in at least all these six other places — already listed earlier:

column 3, lines 19 through 20,  
column 4, lines 55 through 66,  
column 5, lines 18 through 25,  
and 54 through 59,  
column 6, lines 17 through 19,

and even on the coversheet — in his Abstract, at lines 10 through 17.

Therefore it is clear that Best has an associated computer, running software — but he does not offer details about that computer; therefore there is no enablement as to the Applicant's claimed guarding of an "entire system", or as to the Applicant's claimed use of "all COTS" construction.

The Best device, in short, is a only hardware appendage to the "host computer" or "controlling computer" (column 4, line 56)

whose software controls the functioning of Best. The hardware is useless without the host.

At the very least, Best thus fails to satisfy the recitation of claim 6. The Applicant's infrastructure, in contrast to Best, is wholly self sufficient.

Please note that this analysis applies as well to claims 38, 45, 48, 57, 67, 70, 71, 76, and 81 through 83. Therefore the Applicant respectfully asks that the rejections of those claims, too, be withdrawn.

Some of these claims (claims 38, 48 and 70) have now been amended to even more clearly emphasize that the claim refers not merely to the circuits considered alone. (The amendment is particularly justified since the subject matter has been placed on the record by the Official Action passage last quoted above.)

Again, although Best makes clear that there is a host processor (or "computer") and that it is absolutely necessary to operate the hardware, he nevertheless fails to provide enabling disclosure about any details of the computer. Therefore he does not enablingly disclose that e. g. he protects the "entire" computing system, or that the computing system is substantially all-COTS.

CLAIM 9 — In addition to the no-software limitation of claim 1, this claim recites that (emphasis added) "the parallel channels of such computing system are of diverse design or origin." In the Action, in this regard, it is said (emphasis added):

"the parallel channels of [Best's] computing system are of diverse design or origin (column 3, [line] 5: the channels are attached to different computer systems and thus are generated at a diverse origin)."

Applicant respectfully traverses. The specification makes entirely clear that "origin" means "who made it".

The Official Action attempts to dilute the claim language — from channels that "are of" diverse design or origin, to channels that "are generated at" a diverse origin." This is very plainly not the gravamen of the claim language. The point is not the origin of the signals, but rather the origin of the equipment and its operation, i. e., the channels themselves — exactly as recited.

In the original specification it is expressly indicated (emphasis added):

- at page 19, lines 3 through 6 — that the claim recitation refers to subsystems that are diverse "architecturally and even commercially";
- at page 30, lines 9 and 10 — that the limitation calls even more explicitly for "independently designed hardware and software";
- at page 31, lines 4 and 5 — the idea is "diverse hardware designs for the A-, M-, S3-, and D-nodes in order to provide protection against . . . hardware design faults"; and
- at page 52, line 18, through page 53 line 3 — that "even more important is . . . processor diversity";

and with like points reinforced at:

- page 54, line 5,
- page 55, line 16,
- page 56, lines 17 and 18, and
- page 57, also at lines 17 and 18.

Thus, again, the term "origin" means "who made it". This has now been made even more emphatically clear by substituting — in some of the claims — the term "manufacture" for "origin".



(In others of the claims, particularly recognizing the above-cited passage at page 52, the words "and origin" have been simply omitted. Many processor models that are very highly diverse are produced by e. g. the Intel Corporation.)

The same conclusion as to diversity of design or origin is applicable to claims 21, 37 and 43. The Applicant therefore asks that these rejections, too, be withdrawn.

CLAIM 79 — In the Official Action it is further said that Best's "Fig. 3 does not incorporate a circuit breaker". The Applicant respectfully traverses, for three reasons:

CLAIM LIMITATION MISREAD — First, here again the Official Action attempts to dilute the recited limitation — from "the apparatus is not a circuit breaker", as claimed (and as proposed by the Examiner himself in the telephone interviews), to the far-less-definitive "Fig. 3 does not incorporate a circuit breaker".

PRESENT INVENTION INHERENTLY NOT A CIRCUIT BREAKER — Second, the Applicant's specification inherently, by the overall character of the disclosed invention, makes very clear and definite that the Applicant's apparatus is not a circuit breaker. If it were a circuit breaker it would not be able to perform its fundamental intended purpose of guarding the computing system against failure — i. e. of keeping the computing system going. Objectives of a circuit breaker paramountly include shutdown, and thus are antithetical to keeping the system going.

NO DEFINITE NEGATIVE TEACHING IN THE ART — Third, to the extent that the Official Action phrase "incorporate a circuit breaker" carries any meaning at all in this context, then Applicant respectfully submits that recitation of a negative limitation cannot be met by the mere absence of a teaching one way or another.

A greater burden than that must be borne, namely a definite teaching — either inherent (as in the present invention) or express.

Best's disclosure leaves open the possibility that his circuit actually does, in the words of the Official Action, "incorporate a circuit breaker". Best's system lacks a fundamental aim to maintain operation of the whole system if at all possible — and therefore could well "incorporate a circuit breaker". Hence even as interpreted in the Official Action, Best cannot satisfy the limitation.

CLAIMS 13 THROUGH 17, AND 19 THROUGH 21 — Claim 13, and all of its dependent claims including those listed here, recite (emphasis added):

"Apparatus for deterring failure of an entire computing system . . . comprising: . . .  
"circuits of the network for operating programs to guard such entire system from such failure."

In the Official Action it is said that Best teaches just such apparatus, but that assertion is without justification. Best's patent neither shows nor states that he aims to protect an entire computing system from failure.

To the contrary, his invention is expressly for "management, comparison, and correction of redundant digital data" (column 1, lines 2 through 11). What happens to Best's compared, corrected data after it passes beyond the "global . . . interfaces" of his Fig. 1 — or the "host processor data bus" of Fig. 3 — is no concern of Best or his invention.

He adds at column 2, bottom three lines: "The present invention is a system for controlling and managing redundant

inter-processor communication channels." Such channels very obviously are much less than "an entire computing system".

The Official Action virtually acknowledges this, in speaking of (emphasis added): "the plural data channels coming off of the redundant processors inherent to the computer not shown". The Applicant therefore respectfully asks that these rejections, too, be withdrawn.

The foregoing "entire computing system" analysis applies also to claims:

13 through 24,  
34  
42 through 49,  
58,  
62 through 64,  
68,  
72,  
76, and  
77.

Therefore the Applicant also respectfully asks that all these claims be allowed.

CLAIM 15 — In addition to the above-discussed recitation of protecting an "entire computing system", this claim recites also that "the network is an infrastructure". It is said in the Official Action that Best teaches such a network.

Applicant respectfully traverses, because Best's system is not an infrastructure at all. It is simply peer level circuitry that controls and manages communication channels (column 1, lines 1 through 11; and column 2, lines 66 through 69). In fact Best's circuitry is effectively part of the communication channels themselves.

(This discussion of "infrastructure" is applicable to other claims as well, particularly claim 81 — inasmuch as neither Best nor Avizienis 1985 truly describes or teaches an infrastructure. The Applicant therefore respectfully requests withdrawal of the rejections of both these claims.)

CLAIM 19 — This claim recites (once again in addition to the "entire system" recitations of claim 13) that the apparatus is for use with "a computing system that is substantially exclusively made of [COTS] components" (emphasis added). In the Official Action it is said that Best discloses such apparatus.

The Applicant traverses, because Best shows no definite computer — so that the statement in the Action appears to be purely speculative. With greatest respect, it appears to arise entirely from hindsight after seeing the Applicant's claim.

Since Best shows no computer (but only says that there is one), he is not enabling. He fails to teach enough about any computer to convey whether the putatively included computer is COTS, or exclusively COTS, or substantially exclusively COTS — or 100% custom manufactured.

Other claims that include similar recitations are claims 7, 33 and 65 (the two last-mentioned being rejected under § 103). The Applicant accordingly asks that the rejections of all these four claims, as well as their dependent claims, be withdrawn.

CLAIMS 42 THROUGH 44, AND 46 THROUGH 49 — At the outset Applicant notes that claim 42 is subject to the same "entire system" analysis as claim 13 (see page 41 above). It is therefore believed to be allowable for the reasons set forth there.

In addition, in rejecting claim 42 it is said in the Official Action that Best does have a computer, and specifically that (emphasis added):

"the computer disclosed as running the applications [is] not part of the protection system, but [is] at the other end of a bus".

The Applicant agrees that Best vaguely mentions both a local-host processor and a remotely attached communications processor; however, Applicant respectfully traverses because Best has not enablingly "disclosed" specific details of any computer.

In particular he does not enablingly disclose that there is, as claimed in claim 42, any (emphasis added):

"entire computing system that is [guarded] from failure" and that is —

"distinct from the apparatus and that has plural generally parallel computing channels and at least one processor for running an application program".

Among many other possibilities, Best might connect to multiple separate computing facilities on different continents, each with just one communication channel, etc. — on which these "entire system" claims do not read.

Best cannot deter failure of an entire such system. Absent such enabling disclosure, therefore the Applicant respectfully asks that the rejection of claims 42 through 49 be withdrawn.

Even more specific is dependent claim 49, which specifies that the way in which the apparatus guards against failure of the entire computing system is by responding to error signals from

that system. No cited reference does that. Claim 49 is taken up in connection with § 103 rejections, at page 56 below.

Claim 45 has been omitted from the detailed remarks in the Official Action, although it is said elsewhere in the Action (summaries at pages 2 and 5) that claim 45 is rejected under § 102. As mentioned above, the rejection of claim 45 is believed to be inapposite based upon the "no application program" analysis set forth in connection with claim 6 (see pages 36 and 37).

In addition, claim 45 is also believed to be patentable based upon the discussions of claims 42 ff. immediately above and at page 42.

#### Rejections based upon Section 103

In the Official Action it is said that thirty-eight claims (listed at page 14) are unpatentable for obviousness over Best in view of the Avizienis 1985 publication. The Applicant wishes to thank the Examiner for the respect and recognition given to the Applicant's earlier work.

It is true that the Applicant has devoted much of his long, fruitful academic career in the computing field — now *emeritus* from UCLA — to the noble cause of fault-tolerance and reliability. Yet for the five broad reasons set forth below the Applicant necessarily traverses.

UNOBVIOUSNESS OVER THE ART — First, the Applicant's paper appeared twenty-one years ago, and the Best patent issued fifteen years ago. The two documents have coexisted for more than fifteen years, to the present. It was more than ten years even

counting to the filing of the Applicant's provisional application on which the present case is based.

PASSAGE OF TIME — During that time, generations of brilliant computer-science majors have flowed through campuses and into the worldwide ranks of industry and academia alike. All have been exposed, at least as we are required to presume, to the two documents that have been cited in this case.

Most of those people are well above the required legal standard of "ordinary skill" for testing obviousness under the Patent Statute. Nevertheless, as far as we know from the record in this case, or otherwise, none of them has published or patented the invention claimed in this application.

In many fields, fields that move slowly, ten or fifteen years pass in only the blink of an eye and without occurrences of note — but in the computer field ten or fifteen years is an entire era. Thus a reader may search through the two cited references in vain for any mention of Windows®, or the Worldwide Web, or the Pentium chip, or the Blackberry.

STRONGLY FELT NEED — While all these marvelous innovations have come racing forth, and during all that "era", there has always been an enormous NEED for more reliable and "robust" computing. Indeed the unreliability of the Windows operating system is one of the most striking and astonishing facts of the modern world — known to everyone from the hallowed halls of Caltech and MIT to schoolgirls in the back-country of rural China.

Thus it is hardly for lack of need, or lack of recognized need, either, that the two cited references have not been previously combined by people of ordinary skill in this field — or,

for that matter, by people (other than the present Applicant) at any skill level. There must be some other reason.

COURT APPROVAL OF REASONING — The high Courts have found exactly such an analysis to be persuasive of unobviousness. The Applicant respectfully submits that these commonly known facts are dispositive of unobviousness and of patentability, over the combination of references cited in this case — and also over the combination of any references having a like tenure, together, in the eye of the relevant public.

PEER ADMIRATION FOR THE INVENTION — There are still more indicia of unobviousness here. As the Examiner is aware, in 2000 the subject matter of the present patent application was presented as a technical paper, in the world's most prestigious and advanced conference on dependable computing — the Dependable Systems and Networks Conference in New York.

As a result of that publication, several well-recognized high-level computer scientists took the trouble to contact the Applicant with congratulations and commendatory comments — saying, generally, that this subject matter is really a good idea and a remarkable, pioneering advance. This alone is strong evidence that to people whose skill is not merely ordinary but even highly extraordinary, the invention is not at all obvious.

Furthermore the Applicant, Dr. Avizienis, has been invited to present a one-hour keynote address, on the invention of this application — at The World Computer Congress. That is the world's premier conference on computer science and engineering and its applications. It is held every two years, most recently in Toulouse, Montreal and Beijing. The 2006 WCC will be in Santiago, Chile in August.

To be invited (all expenses paid) to give such an address is



considered one of the highest international recognitions in information processing. The WCC is organized by the International Federation for Information Processing, which includes over fifty of the world's most advanced countries.

Yet this is the selfsame invention which the Official Actions in this case have denigrated, for four years now, as "obvious".

With respect, the foregoing discussion would appear sufficient to overcome all the rejections stated in pages 14 through 50 of the Official Action. The Applicant therefore asks that all those rejections be withdrawn.

REFERENCES NOT COMBINABLE — Second, the Applicant nevertheless also wishes to point out that the teachings of the two references fail to be fundamentally compatible for purposes of combination. It is well understood that cited references need not be lined up one-for-one, enabling one machine to perfectly dovetail with and fit seamlessly into the other; however, as a practical matter some elementary level of compatibility is a requisite.

Without this much, it can never occur to the person of ordinary skill (not a very high level of skill, as is generally agreed) to combine their respective features. Thus combination of these two references is implausible:

- Best is a very narrow, mechanistic, practical-minded, simple software-controlled operational, commercial, hardware-voting product that solves a very limited operational problem; whereas
- Avizienis ('85) is a very broad, conceptually lofty theoretical presentation of a software operating system built to conduct an academic experiment.

The part of the Avizienis paper that is prominent in the Official Action is the discussion of the DEDIX — the "Design Diversity Experiment". This experimental all-software system (i. e. the DEDIX) was never an operational commercial software-controlled product like Best, never meant to operate automatically unattended for long periods like Best.

Rather the DEDIX, as plainly described in the cited paper, was an all-software experiment. It was not fully automatic, but rather was intended for closely supervised operation — starting, briefly running and then stopping again, in fits and starts, by multiple experimenters in academic labs around the world.

See, for example, the paragraph bridging pages 1498 and 1499 in the cited 1985 paper. It is there pointed out that the basic character of the experiment (the DEDIX) was to be stoppable, debriefable, injectable with new data, and even replayable, in a debugging mode! This exercise was all to facilitate the academic, experimental objectives of learning what problems surface in trying to compare "N versions" of fault-tolerant software.

Actually it is a conceptual horror to think of somehow "combining" features from the Avizienis paper with features from Best. In real-world academic terms and operational-equipment terms, it has almost no meaning.

In the patent world, which after all is supposed to mirror the real world in some fashion, this combination can only be called improper. The Applicant therefore requests again, but now for this second reason very unlike the above-detailed first reason, that all these rejections be withdrawn.

FAILURE OF UNDERLYING § 102 REJECTIONS — Third, of the 38 claims rejected under § 103, more than half depend from claims taken up in the preceding section that deals with anticipation rejections under § 102. Those more-than-half are at least the twenty-two

claims listed here: 2, 3, 10, 12, 18, 22 through 24, 41, 46, 49, 70, 75, 52, 56 through 61, 64, 78 and 80.

The Applicant respectfully submits that almost all of these twenty-two claims are patentable by virtue of the same reasons presented above for failure of the § 102 rejections. That is, in almost all cases the basic positions espoused in the Official Action for the § 102 rejections are shown to be in error or inapposite; and these same errors are repeated in the § 103 context — thus equally undermining the § 103 rejections.

To the extent that the errors are not repeated expressly, nevertheless the dependent claims are by definition narrower than their parent claims — which have now been seen to survive § 102. The narrower dependent claims are therefore patentable too.

SUPPLEMENTAL ANALYSIS OF § 103-REJECTED CLAIMS NOTED ABOVE — Fourth, below the Applicant presents claim-specific responses particularly to four claims or claim groups that stand rejected but are not fully discussed above.

(1) CLAIMS 2 AND 50, 51, 56 THROUGH 61, AND 71 THROUGH 75 — Claim 2 recites that the apparatus (emphasis added):

"comprises means for automatically responding to the at least one error signal by generating the at least one recovery signal for guarding all such system against failure".

It is said in the Official Action, in analyzing claim 2, that the DEDIX experiment — as described in the 1985 Avizienis paper — satisfied those recitations. The Action also goes on (emphasis added):

"page 1498 [of Avizienis] discloses . . . local and global executives . . . providing commands to the version which prevent failure".

With respect, both these statements are factually in error. It was not the function of the experiment (the DEDIX) to prevent failure, and it did not do so.

Rather, the DEDIX experiment facilitated monitoring and studying failure. In the context of the experiment (the DEDIX), truly preventing failure would have left no failure to study, and thus would have been counterproductive!

Thus for example on the cited page 1498, in the paragraph bridging the two columns, the 1985 paper says (*italics in original, underscoring added*):

"The local executive will first try to recover locally before it either reports the problem . . . or, if it is considered as fatal to the site, closes down the site. Three classes of exceptions can occur. *Functional exceptions* are specified . . . . Among them are . . . the case when a communication link is disconnected, and the case when a cc-vector is completely missing. For these exceptions, the local executive will attempt to keep the site active, possibly terminating the local version, while keeping the input/output operating."

The underscored words show that the local executive "reports" failure — to its human operators. The reports aren't "guarding against . . . failure". It is an academic study procedure only.

Please notice the phrase "fatal to the site". That does not mean "fatal to obtaining data". It means, *e. g.*, that the site may burn down or cause bodily harm.

Likewise if a communication link is "disconnected" or a checkpoint vector "is completely missing", obviously the system must not have been "guarding against . . . failure". These failures are extremely serious, *i. e.* "fatal" — and in any true failure-guarding mode they must be prevented or the apparatus terminated.

The conclusion is plain that the DEDIX did not prevent failure, and did not satisfy the language of claim 2. Some additional discussion may clarify what it actually did do. It performed these three kinds of tasks, none for purposes of guarding against failure:

First, after such fatal failures the DEDIX tried to keep the site running! — though "possibly terminating the local version" but "keeping the input/output operating." In any kind of operational system there is no point in keeping a site — or its "input/output" — running in the face of such catastrophic failures. Thus the DEDIX was for providing debuggability of failure, for academic analysis, not for preventing failure.

As to a second kind of task, the very page cited in the Official Action goes on (*italics in original, underscoring added*):

"Implementation exceptions are dependent on the specific computer system, language, and implementation technique chosen. . . . Other examples are all the exceptions defined in DEDIX, such as signaling when a function is called with an invalid parameter or when an inconsistent state exists. Most of those exceptions will force an orderly closedown of a site in order to be able to provide data for analysis."

Here it is stated expressly that the DEDIX provides "signaling" — to its human handlers, obviously — when some disaster has occurred. Such an event ordinarily will and should bring a computing system absolutely to its knees: an "invalid parameter" or an "inconsistent state".

Yet the DEDIX instead forces "orderly closedown". It does so for an explicitly stated reason: "in order to provide data for analysis".

This reason for operating procedure of the DEDIX diverges abruptly from the claim-2 limitation "guarding against . . . failure".

As to a third kind of task, here is yet another excerpt from the same passage (*italics in original, underscoring added*):

"Finally there are exceptions generated by the local version. The local version program may include provisions for exception handling and some of the exceptions may not be recoverable within the version. These exceptions are sent to the local executive which will terminate the local version while keeping the site alive."

Once again, the experiment was "keeping the site alive" — but terminating the local version. Why? Because that site was, perhaps, someone's lab computer in, say for instance, New Zealand.

Yes, the UCLA experiment had to be stopped because it had come to some sort of stymie and couldn't run anymore until the postdoc came into the NZ lab in the morning to figure out what had happened. It would wreak havoc, however, to shut down that person's independent data crunching, on some completely different academic project, that was supposed to run all night and indeed maybe all month.

The conclusion, again, is that the DEDIX did many things but did not guard against failure. Therefore the Avizienis '85 paper combined with Best can't render obvious the invention of claim 2.

The proposed combination of references furthermore fails to satisfy the claim-2 recitations that the invention "receive[s] at least one error signal generated by such system in event of incipient such failure" and provides "at least one recovery signal to such system". The Avizienis paper describes almost exactly

the opposite of this recitation — as will be explained more fully in the later discussion of claim 12.

Finally as to claim 2, it is also said at the bottom of page 15 of the Official Action that it would have been obvious to one of ordinary skill (emphasis added):

"to implement the fault tolerant portions of the . . . DEDIX . . . with the hardware fault locating and handling system of Best, thereby creating a stronger N-version software system."

As to this additional purported justification for the rejection, the Applicant respectfully traverses, for yet another group of three independent reasons:

First and most important, the hypothetical hybrid described in the Action fails to come up to the claimed invention. Neither claim 2 nor any other claim, through at least claim 11, is a "software system" as posited in the Official Action. Once again, these claims all recite that the invention has "substantially no software".

Second, the Applicant submits that no such "stronger" system could result from substituting Best's hardware — with its own required associated software — for the same functions already present in the DEDIX. The Best hardware would have to be added into the minicomputers running the DEDIX, hooked up through some ports in these computers, and then Best's control software would have to be integrated into the DEDIX software.

After all that, there is no reason to suppose the resulting hybrid would be in any way better than the original DEDIX. Consequently there is absolutely no motivation for the proposed combination.

Third, the Applicant submits that it would not even occur to an ordinarily skilled person, looking at the two cited references, to think about combining them. They just have an "apples and oranges" quality — i. e., mutually irrelevant.

Thus there is no proper basis for reading claim 2 on the DEDIX research described in the Avizienis 1985 paper. The same is true for all the other "failure guarding" claims in this case.

Most of this analysis applies in particular to claim 50. The Applicant therefore respectfully submits that the cited combination of references does not come up to the invention of claim 50. Nevertheless in the interest of moving this case forward toward allowance the Applicant has amended claim 50 by incorporating the limitation of former claim 70 (now canceled) — namely, that the invention guards the entire computing system against failure.

The Applicant therefore respectfully asks that the rejections of claims 2 and 50 — and the several dependent claims of claim 50 — now be withdrawn. The dependents are 51, 56 through 61, and 71 through 75, all of which also add additional distinguishing limitations discussed earlier.

(2) CLAIMS 2, 12, 18, 24; 33 THROUGH 38; 41, 54, 61, 64 THROUGH 69, AND 80 — All these twenty claims recite that the protected computing system has a subsystem that generates a response to failure. The protecting invention sees that response, analyzes the situation and returns a corrective signal that guards against overall system failure.

Some of these claims, particularly claim 33 ff., also recite that the computing system has another subsystem which receives recovery commands returned from the invention. In this event the invention "interposes" analysis between the two subsystems.



In the Official Action as to several of these claims it is said that Avizienis '85 correspondingly teaches (emphasis added):

"a computing system . . . that has at least one subsystem for generating a response to failure (page 1498 describes the Version layer reporting errors and receiving decisions results).

Applicant respectfully traverses, because this description is backward. In the DEDIX, the version layer did not report errors.

Rather, as described by Avizienis, it received error reports from the DEDIX, with corrected data to reinject into the "cc" ("cross-check") points. Then the experiment could go on.

Please notice also that such revision and reinsertion of the data, with restarting of the process, are wholly alien to the concept of claim 1 and thus claim 2 (and claim 3). These claims recite that the invention deters failure of the computing system and guards that system from failure, whereas the Avizienis paper describes instead exactly the opposite: the DEDIX first allowed the computing system to fail, and only then stepped in to tell it what it should have done.

Essentially this same analysis is true for all these twenty claims — and also for claims such as 49 and 73. These recite in a more-abbreviated way that the invention receives error messages from the computing system and issues recovery commands.

It is true as well for claim 81 and its dependent claims 82 and 83. Claim 81 further recites that the apparatus is an infrastructure, which does not read on Best's peer circuitry or on the DEDIX experimental operating environment staffed by people. The Applicant therefore respectfully asks that the rejections of all these claims be withdrawn.

(3) CLAIM 3 — In the Official Action it is said that the DEDIX is generic as recited in this claim, and that this generic property can be carried through to a hardware system taught by Best. For these three reasons, Applicant traverses:

First, neither Best nor Avizienis teaches an all-hardware system as recited in claim 1; and claim 3 depends from claim 1. Hence the claim is not met.

Second, neither Best nor the DEDIX is an infrastructure. As noted earlier, Best is only peer circuitry, while the DEDIX is an experimental operating environment with human participants.

Third, neither of the references satisfies the claim-3 recitation that the invention (emphasis added) "can accommodate any such system that can issue an error message and handle a recovery command". Rather, both references describe system requirements that are highly specific to the computing systems hosted:

The control software of Best's system of course was entirely custom made to operate his hardware. For the DEDIX, application programs had to be explicitly and specially written to provide the "cross-check" points mentioned earlier.

This analysis (except for the "all hardware" factor mentioned first) applies equally well to claims 23, 35, 46, 55 through 59, 61, 69, 74, 75 and 78. In addition the discussion of infrastructure applies to claim 81, and its dependents — claims 82 and 83. The Applicant therefore respectfully requests withdrawal of the rejections of all these seventeen claims.

(4) CLAIM 10 — This claim too contains the all-hardware limitation mentioned above, and this alone would be sufficient to

distinguish the cited combination. Furthermore this claim recites that the apparatus (emphasis added):

"is particularly for use with a computing system that has plural processors; and wherein:

"the circuits comprise portions for identifying failure of any of such processors and correcting for identified such failure."

In the Official Action as to this claim 10 it is said that (emphasis added):

"Best does disclose 'dissimilar computing elements . . . ' but not specifically processors; Avizienis does disclose processor indirectly by monitoring for processor errors . . . . Avizienis handles processor faults, while Best simply handles any fault coming down the communication channel"

This excerpt appears intended to imply that the combination of references makes obvious the claimed identifying of processor failure. Applicant traverses, as both references are irrelevant:

The quoted excerpt from the Action appears to concede that Best does not teach use of plural processors — and as shown earlier his system has an associated host computer that runs control software. Thus it is not a "hardware network . . . having substantially no software".

Avizienis describes the DEDIX, which does have multiple processors; but they, too, all run software. Thus both references are irrelevant to claim 10.

The Applicant therefore respectfully asks that the rejection of claim 10 be withdrawn. The immediately foregoing comments apply as well to claims 22, 52 and 55; and the Applicant also asks that rejection of these three claims, too, be withdrawn.

Conclusion

In view of the foregoing amendment and remarks, the Applicant respectfully requests reconsideration and allowance of all claims now standing in this case. In addition, noting the extremely high cost of continuing prosecution of this application — not only to the Applicant but to the Government as well — it is earnestly requested that, should there appear any obstacle to allowance of the claims herein, the Examiner telephone the undersigned attorney to try to resolve the obstacle.

Respectfully submitted,



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